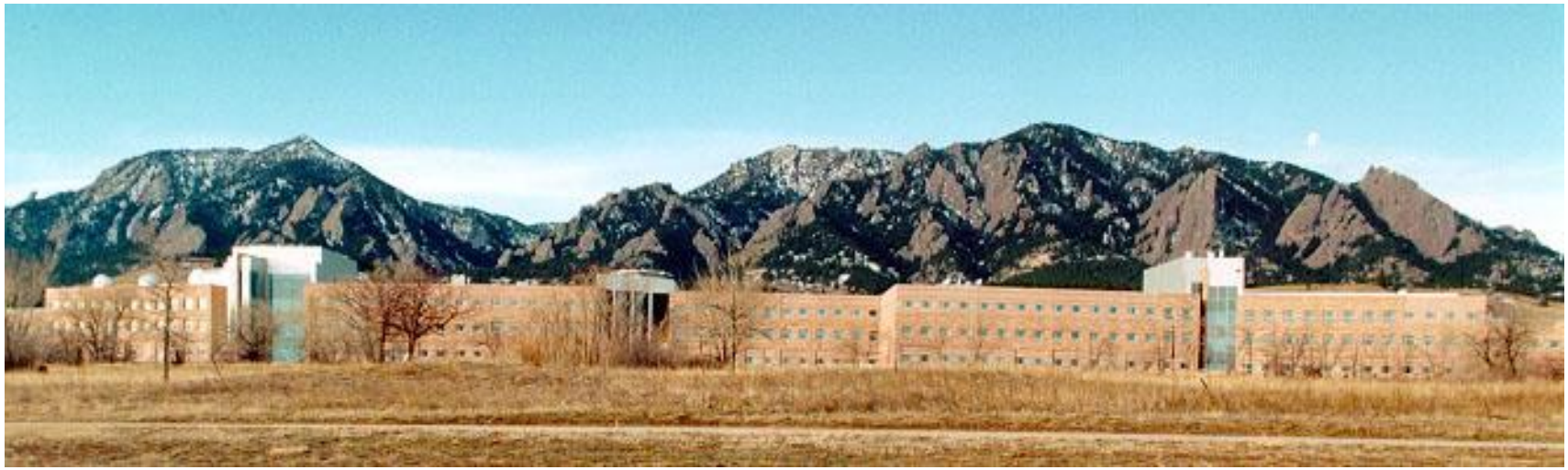

STP Quarterly Review

24 Oct 2012

4QFY12

William Denig

Solar & Terrestrial Physics Division

NOAA/NESDIS/NGDC

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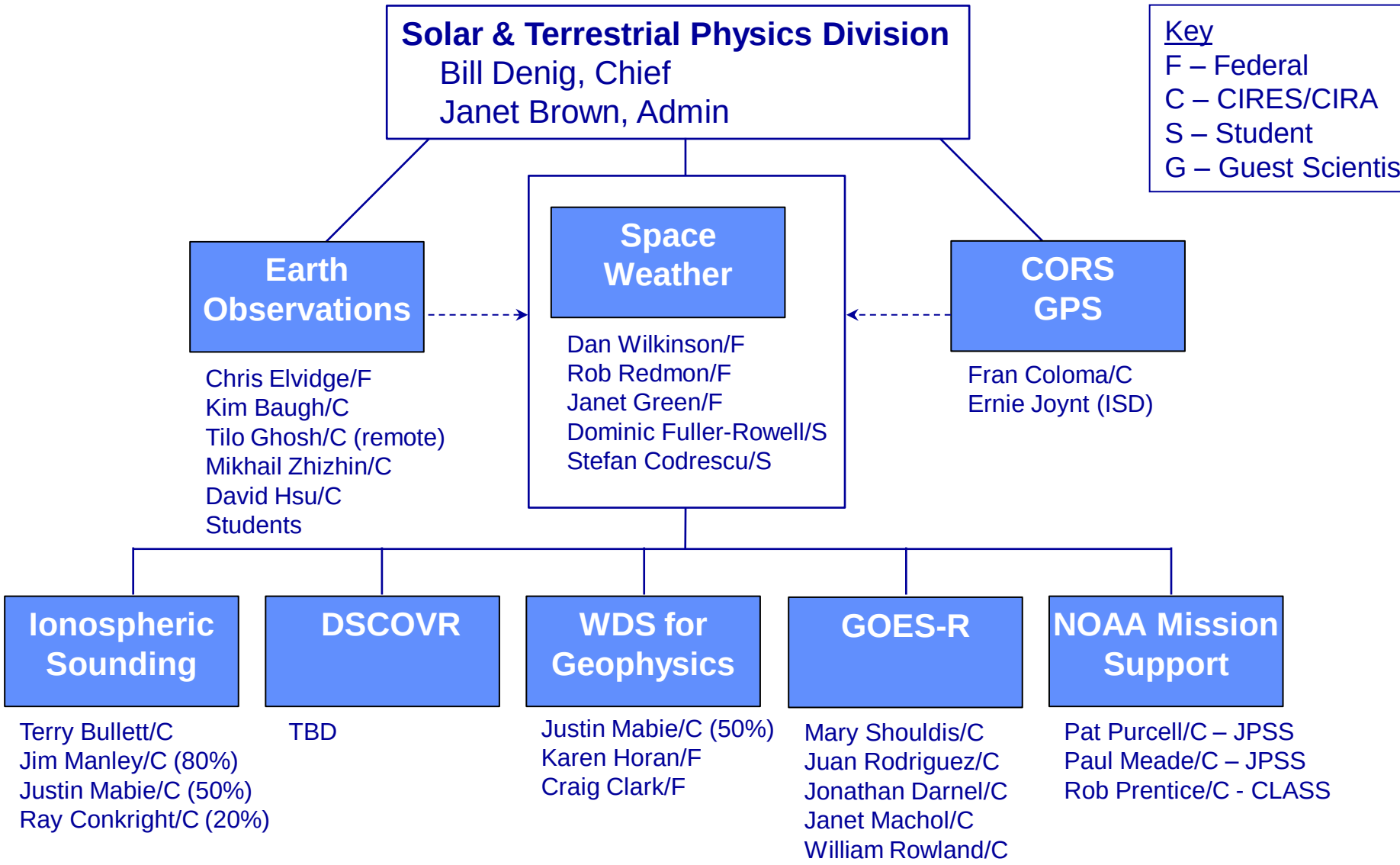
William.Denig@noaa.gov

OUTLINE

Solar & Terrestrial Physics Division

- **STP Division Overview**
- **Milestones & Performance Measures**
- **Accomplishments & Updates**
- **Issues & Summary**

STP Division Overview
Personnel



STP Division Overview
Personnel Changes

- Gains
  - None
- Losses
  - None
- Reassignments
  - Anu Sundaravel – from web development to SPIDR support
- Inbound
  - None
- Vacancies
  - Space Weather Physicist (Federal) – Solar Program/SXI-SUVI
  - Programmer (CIRES) – vice Elespuru – 50% with MGG (posted)
  - DSCOVR Systems Engineer (CIRES/CIRA) – (awaiting receipt of funds)

STP Division Overview
Balance Sheet – FY13 (Estimated)

Income				
	FY12 Carryovers	FY13 Income	Total	
Base Allotment (estimate)		$1,200,000	$1,200,000	
NASA ROSAS (Green)		$100,000	$100,000	
SPSRB (Redmon)		$64,400	$64,400	
GOES-R (PN76)		$387,500	$387,500	
GOES-R (PN77)		$384,620	$384,620	
GOES-R (Cal/Val)		$300,000	$300,000	
DSCOVR Data Stewardship		$244,000	$244,000	
OD Program Support		$242,979	$242,979	
NASIC		$100,000	$100,000	
JPSS Imagery Team		$75,000	$75,000	
JPSS Proving Ground		$145,000	$145,000	
NTL Data Sales	$81,856	$35,000	$116,856	
McMurdo (DMSP)		$56,000	$56,000	
CORS		$208,000	$208,000	
Total Income	$81,856	$3,542,499	$3,624,355	**$3,624,355**

Expenses				
	FY12 Paybacks	FY13 Expenses	Total	
Salaries		$2,611,314	$2,611,314	
Travel		$39,000	$39,000	
ISD Support		$216,531	$216,531	
Miscellaneous		$90,000	$90,000	
OD overhead		$205,792	$205,792	
FY14 Forward Funded		$228,000	$228,000	
Total Expenses		$3,162,637	$3,162,637	**$3,162,637**

Balance Sheet				
	Net FY12	Net FY13	Net	
Balance Sheet	$81,856	$379,861	$461,717	**$461,717**
			As of 21 Oct 12	
Notes				
-All estimates used for planning purposes only				

STP Division Overview
Agreements – Status

Agreements

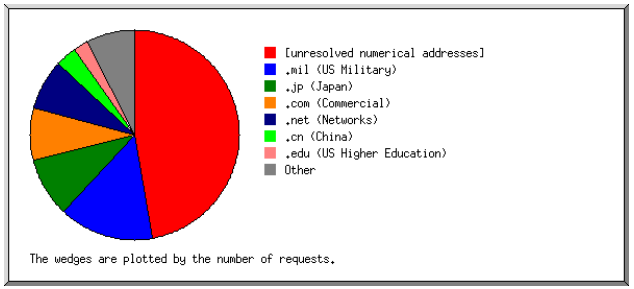
Scope	Team	Type	Partner	NOAA Legal	DOC Legal	NGDC Signed	Partner Signed	Start	End	Status	
CORS Support	CORS	AGR	NGS	n/a	n/a	X	X	10/01/2003	09/30/2013	G	In place - IC complete
SWx Climatology	SWX	MOU	AFCCC	X	X	X	X	05/27/2004	10/01/2014	G	In place - no FY12 activity
GPS Data (CORS)	SWX	MOA	Multi	n/a	n/a	X	X	09/20/2004	TBD	G	*Biannual Review - waiting on NGS*
DMSP Archive	NTL	MOA	DMSP	X	X	X	X	05/30/2007	09-30/2009	G	*In process - Blanket MOA*
Ionosonde Sites	SWX	IA	USGS	X	X	X	X	04/03/2009	04/03/2013	G	In place - FY12 site support
ViRBO	SWX	MOA	NASA	X	X	X	X	04/15/2009	n/a	G	In place - no FY12 activity
SEM-N - AFRL	SWX	MOA	AFRL	X	X	X	X	05/11/2009	05/11/2014	G	In place - DWSS cancelled
Nighttime Lights	SWX	MOU	DOE	X	X	X	X	08/12/2009	08/12/2013	G	In place - nothing to report
NASIC	NTL	MOU	NASIC	X	X	X	X	03/09/2011	01/30/2015	G	In place - nothing to report
Gas Flaring	NTL	SA	WBank					05/22/2012	06/30/2013	G	In place - nothing to report
Global CO2	NTL	AGR	NASA	n/a	n/a	n/a	n/a	07/29/2011	09/30/2012	G	*To be renewed*
SEM-N Algorithms	SEG	MOU	SMC	X	X	X		08/01/2011	07/31/2013	G	In place - DWSS cancelled

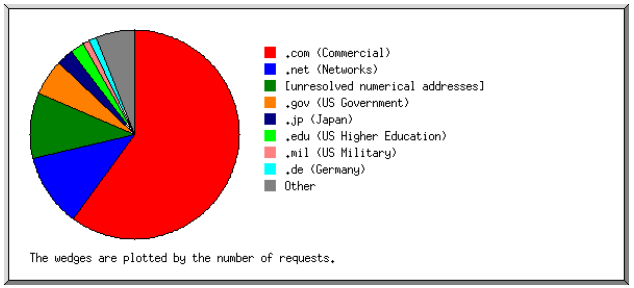
As of 24 Oct 2012

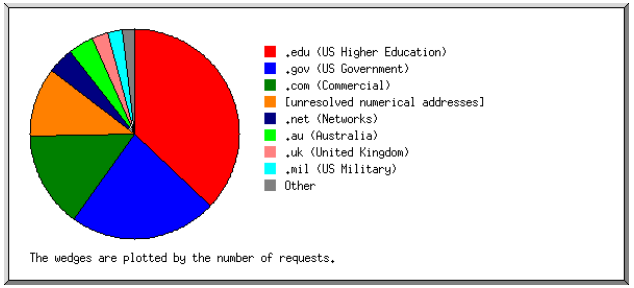
G	No Action Needed
Y	Watch Item
R	Action Required

STP Division Overview
MOA – DMSP Archive – Web Statistics

- AFWA requested information regarding the usage of USAF data. The following analysis was gleaned from the YTD[1] web statistics:
- DMSP data (mostly OLS)
  - Requests (all): 4,428,709
  - Requests (.mil): 620,019 (14.6%)
  - Requests (.gov): 50,487 (1.14%)
  - Total download: 5.44 TB
- Solar data (includes USAF – see details)
  - Requests (all): 15,973,043
  - Requests (.mil): 177,301 (1.11%)
  - Requests (.gov): 894,490 (5.50%)
  - Total download: 3.49 TB
  - Details: RSTN (342,853) / SOON (87,415) / DMSP SWx (37,643)
- Ionosonde data (Data provider to AFWA)
  - Requests (all): 37,492,801
  - Requests (.mil): 847,337 (2.26%)
  - Requests (.gov): 8,510,866 (22.7%)
  - Total download: 5.41 TB







Data provided courtesy of Rich Fozzard – Thanks!

[1]Normalized to 1 year

STP Division Overview
GOES Spacecraft/Instrument Status

Spacecraft	Series	Operational Status	Status	Magnet1	Magnet2	Magnetometer 1	Magnetometer 2	MAG	XRS	XRS-EUV	EXIS	EPS	HEPAD	SEISS	XRP	SXI	SUVI
GOES 8	GOES I-M	Decommisioned	R	G	G				G			G	G		G		
GOES 9	GOES I-M	Decommisioned	R	G	G				G			G	G		G		
GOES 10	GOES I-M	Decommisioned	R	G	G				G			Y	G		G		
GOES 11	GOES I-M	Decommisioned	R	G	G				R			G	G		R		
GOES 12	GOES I-M	South America	G	G	G				R			Y	G		R	R	
GOES 13	GOES N-O-P	Operational East	G			G	G			Y		G	G			Y	
GOES 14	GOES N-O-P	Standby	G			G	G			G		G	G			G	
GOES 15	GOES N-O-P	Operational West	G			G	G			G		G	G			G	
GOES R	GOES R	Acquisition						TBD			TBD			TBD			TBD
GOES S	GOES R	Acquisition						TBD			TBD			TBD			TBD

As of: 19 Oct 2012

Operational (or capable of)	G
Operational with limitations (or Standby)	Y
Operational with Degraded Performance	O
Not Operational	R
Status Unknown	TBD

Note: SWPC operations use GOES-15 SEM & SXI, GOES-14 SEM & SXI, GOES-13 SEM (no XRS). All available GOES and POES Space Weather data flowing into NGDC.

STP Division Overview

STP Annual Data Ingest[1] – 4QFY12

	CY10 GB	CY11 GB	CY12 YTD
GOES SEM	71	71	61
GOES SXI	870	1,731	1491
POES SEM	30	29	23
DMSP OLS	5,000	5,760	3,290
CORS GPS	20,198	24,456	18,432
Ionosonde	1,400	900	*800*[2]

[1]Uncompressed data volumes
[2]Estimate

OUTLINE
Solar & Terrestrial Physics Division

STP Division Overview

Milestones & Performance Measures

Accomplishments & Updates

Issues & Summary

Milestones & Performance Measures

FY12 AOP Milestones

Primary NGSP Goal: Objective	Performance Measures / Milestones (NOTE: Do not report Measure or Milestone Targets in the same row)	Select any				Measure or Milestone Targets (NOTE: Do not report Measure or Milestone Targets in the same row)												Milestone Progress		
	Measures/Milestone	GPRA	NOAA BSC	LO/SO BSC	HPPG	10	11	12 Q1	12 Q2	12 Q3	12 Q4	13	14	15	16	17	18	Planned/ Actual Completion	Status	POC
Weather:Environmental Information	Complete the historical data rescue of daily H-alpha solar images from the NOAA Boulder Observatory (1967-1994)							X										31-Dec-11	C	K. Horan
Weather:Environmental Information	Archive interplanetary data simulation runs for the Enlil operational space weather model per NWS request								X									31-Mar-11	C	W. Denig
Coastal:Marine Transportation	Achieve Initial Operating Capability (IOC) for disseminating in real-time satellite data received via McMurdo Station in compliance with the Antarctic Treaty									X								30-Jun-12	C	S. Anderson
Weather:Environmental Information	Develop in-house capability to process NOAA POES Space Enviroment Monitor (SEM) data for satellite operations										X							30-Sep-12	C	J. Green
Weather:Environmental Information	Complete Phase 3 Preliminary Design Reviews for GOES-R Level 2+ space weather algorithms										X							30-Sep-12	C	M. Shouldis
Weather:Environmental Information	Maintain > 95% of availability of Space Environment Monitor (SEM) satellite data archived on an annual basis					>95	100%	95	95	95	95	95	95	95	95	95	95	1QFY12	100%	D. Wilkinson
																		2QFY12	100%	
																		3QFY12	100%	
																		4QFY12	100%	
Coastal:Marine Transportation	Acquire, process, and disseminate >95% of available real-time nighttime lights imagery within 3 hours of receipt					>95	100%	95	95	95	95	95	95	95	95	95	95	1QFY12	100%	C. Elvidge
																		2QFY12	100%	
																		3QFY12	100%	
																		4QFY12	100%	
Weather:Environmental Information	Provide a > 95% availability for Continuously Operating Reference Station (CORS) near real-time data to to the NWS Space Weather Prediction Center					>95	100%	95	95	95	95	95	95	95	95	95	95	1QFY12	100%	F. Coloma
																		2QFY12	100%	
																		3QFY12	100%	
																		4QFY12	92.8%	

As of 21 Oct 2012

Milestones & Performance Measures

FY12 AOP Milestones

4QFY12 Milestone: Develop in-house capability to process NOAA POES Space Environment Monitor (SEM) data for satellite operations.

4QFY12 Milestone: Complete Phase 3 Preliminary Design Reviews for GOES-R Level 2+ space weather algorithms

Primary NGSP Goal: Objective	Performance Measures / Milestones (NOTE: Do not report Measure or Milestone Targets in the same row)	Select any	Measure or Milestone Targets (NOTE: Do not report Measure or Milestone Targets in the same row)												Milestone Progress		
Coastal:Marine Transportation	Achieve Initial Operating Capability (IOC) for disseminating in real-time satellite data received via McMurdo Station in compliance with the Antarctic Treaty					X									30-Jun-12	C	S. Anderson
Weather:Environmental Information	Develop in-house capability to process NOAA POES Space Environment Monitor (SEM) data for satellite operations						X								30-Sep-12	C	J. Green
Weather:Environmental Information	Complete Phase 3 Preliminary Design Reviews for GOES-R Level 2+ space weather algorithms						X								30-Sep-12	C	M. Shouldis
Weather:Environmental Information	Maintain > 95% of availability of Space Environment Monitor (SEM) satellite data archived on an annual basis		>95	100%	95	95	95	95	95	95	95	95	95	95	1QFY12	100%	D. Wilkinson
															2QFY12	100%	
															3QFY12	100%	
															4QFY12	100%	
Coastal:Marine Transportation	Acquire, process, and disseminate >95% of available real-time nighttime lights imagery within 3 hours of receipt		>95	100%	95	95	95	95	95	95	95	95	95	95	1QFY12	100%	C. Elvidge
															2QFY12	100%	
															3QFY12	100%	
															4QFY12	100%	
Weather:Environmental Information	Provide a > 95% availability for Continuously Operating Reference Station (CORS) near real-time data to to the NWS Space Weather Prediction Center		>95	100%	95	95	95	95	95	95	95	95	95	95	1QFY12	100%	F. Coloma
															2QFY12	100%	
															3QFY12	100%	
															4QFY12	92.8%	
																As of 21 Oct 2012	

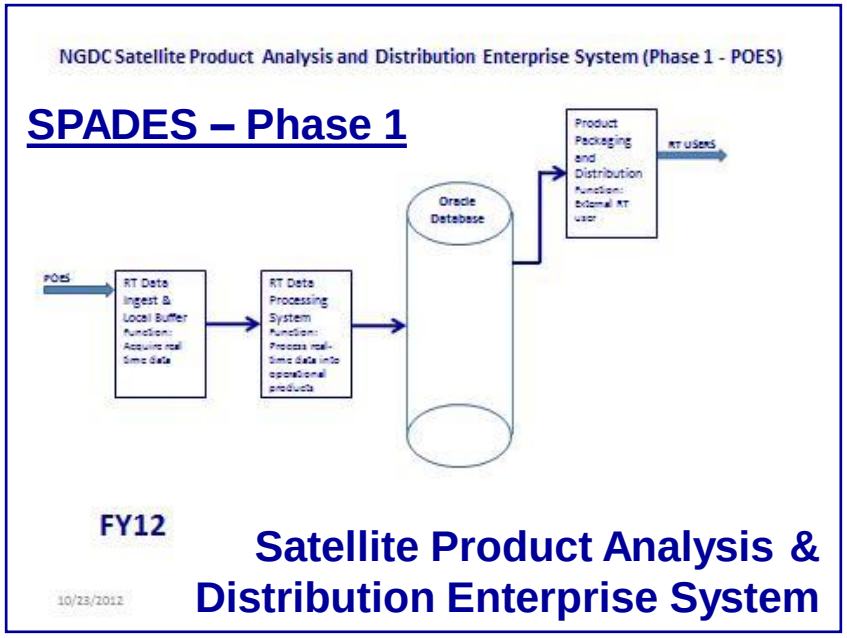
Milestones & Performance Measures
POES/MetOp Processing

4QFY12 Milestone: Develop in-house capability to process NOAA POES Space Environment Monitor (SEM) data for satellite operations.

- Planned Completion: 4QFY12 (30 Sep 12)
- Actual Completion: 4QFY12 (23 Oct 12) {*OK, it was a bit late*}

Status – Basic functionality has been completed although some testing remains.

Significance – NGDC has now assumed responsibility for processing the POES and MetOp SEM data per the SWx Functional Transfer Plan, executed 09 Jan 12. Effort completes Phase 1 of the SPADES concept. ***Thanks Ken Tanaka***



Milestones & Performance Measures
GOES-R SWx Algorithms

4QFY12 Milestone – Complete Phase 3 Preliminary Design Reviews for GOES-R Level 2+ space weather algorithms.

Completion:
- Planned: 4QFY12 (30 Sep 12)
- Actual: 4QFY12 (10 Sep 12)

Status – PDRs for the 7 Phase 3 L2+ products have been completed in accordance with STAR procedures

Significance – L2+ space weather products are required by SWPC to maintain and improve current level of service.

Note: The NWS has prioritized phase 3 algorithms in consideration of reduced year-3 funding (Mar '13 – Mar '14). Options for program continuation are under development .

Phase 3 L2+ Products (prioritized)

XRS.10: Flare Location

SUVI.14: Flare Location (XFL) Reports

SEISS.20: Event detection based on flux values

SUVI.15: Coronal Hole Boundaries

SUVI.13: Bright Region Data

MAG.12: Sudden Impulse (SI) detection

EUVS.05: Multi-wavelength Proxy

Blue Text – Legacy Product
Red Text – New Product

Milestones & Performance Measures

FY12 Performance Measures

STP Annual Performance Measures

Space Weather Metric

LO	Goal	Objective	Performance Measure	POC	1QFY12	2QFY12	3QFY12	4QFY12
NWS	Weather-Ready Nation (NWS)	A More Productive and Eficient Economy Through Environmental Information Relevant to Key Sectors of the U.S. Economy	Greater than 95% (2 sigma) of available Space Environment Monitor satellite data are archived on an annual basis	Wilkinson	100%	100%	100%	100%

Nightime Lights Metric

LO	Goal	Objective	Performance Measure	POC	1QFY12	2QFY12	3QFY12	4QFY11
CS	Climate Adaptation and Mitigation (CS)	Improved Scientific Understanding of the Changing Climate System and Its Impacts	Acquire, process and disseminate >2 sigma (95%) of available real-time nighttime lights imagery within 3 hours of receipt	Elvidge	100%	100%	100%	100%

CORS

LO	Goal	Objective	Performance Measure	POC	1QFY12	2QFY12	3QFY12	4QFY11
NOS	Resilient Coastal Communities and Economics (NOS)	Resilient Coastal Communities That Can Adapt To The Impacts Of Hazards And Climate Change	Provide a >2 sigma (95%) availability for Continuously Operating Reference Station (CORS) near-real-time data to the NWS Space Weather Prediction Center as per the '4-way' Memorandum of Agreement and subject to normal business-hour response times.	Coloma	100%	100%	99.8%	92.8%

As of 02 Oct 12

- Greater than 99% (3-sigma) Cumulative Distribution
- Greater than 97% (2-sigma) Cumulative Distribution
- Greater than 84% (1-sigma) Cumulative Distribution
- Below 84.1% (1-sigma) Cumulative Distribution

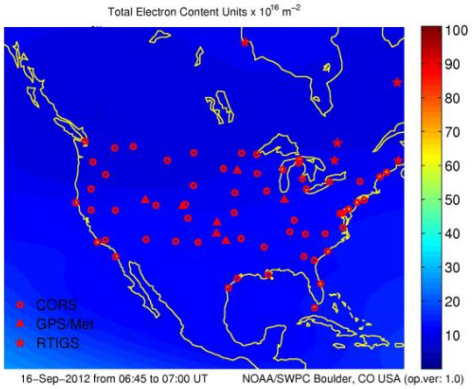
Note: NGDC outage from 16-22 Sep adversely affected CORS operations. Details on next slide. The “annual” metric is still intact

Milestones & Performance Measures

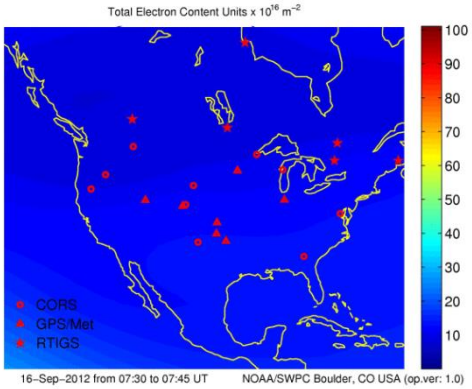
NGDC Service Disruption: 16 Sep 12

The NGDC service disruption that occurred on Sep 16th impacted CORS operations for providing real-time GPS data to SWPC (annual metric). Full service was restored on Sep 22nd. Only real-time functions were affected. No long-term data loss.

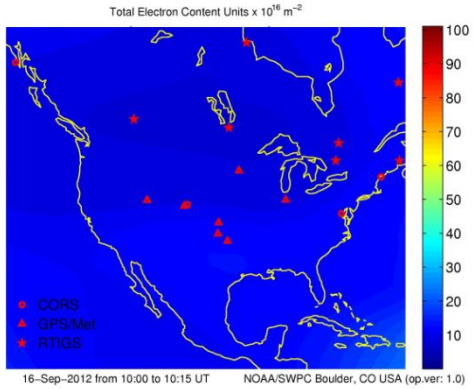
See Note



Normal: 81 stations
16 Sep @ 06:45



Degraded: 24 stations
16 Sep @ 07:30



Degraded: 18 stations
16 Sep @ 10:00

Other impacted programs:

- Satellite Data Services – Significant efforts were required to recover missing operational datasets received from SWPC. Recovery in progress – full recovery expected.
- Ionospheric Program – Mirrion ingest traffic sluggish to non-existent. Customer notified T.B. that RT-deliveries were out of spec. Data backlog now recovered.
- Nighttime Lights – Difficulties were encountered acquiring VIIRS data from CLASS. No customers reported loss capabilities.

Note: SWPC considers US-TEC to be unreliable for less than 30 GPS stations

Milestones & Performance Measures

FY13 Metrics (1 of 3)

PROPOSED

	Space Weather Program	
★	Spacecraft Charging	Host technical workshop on the release of the next generation radiation belt models referred to as AP9/AE9 (Green/1QFY13)
	PeEPS	Demonstrate at the American Geophysical Union 2012 Fall Meeting new capabilites for the social media utility referred to People Empowered ProductS (Green-Redmon/1QFY13)
	DMSP SWx	Develop an 11-year database of calibrated precipitating electron and ion fluxes from the Defense Meteorological Satellite Program Special Sensor Electron and Ion Spectrometer (Redmon/3QFY13)
	World Data Service	
	Monthly Bulletins	Resume monthly production of the NOAA/NGDC Geomagnetic Indices Bulletin and Solar Indices Bulletin (Mabie-Clark/1QFY13)
	Ionosonde Data Services	
	Ionosonde Installation	Promote scientific research within Africa by installing a new-generation, advanced research ionospheric sounder at Maseno University on the equator near Kisumu, Kenya (1QFY13/Bullett/1QFY13)
	GOES-R Program Support	
★	GOES RRRR/AR	Complete Critical Design Reviews for selected Level 2+ ground-processing algorithms for the GOES-R space weather sensors (Shouldis/3QFY13)
	GOES-R Cal/Val	Identify and complete key tasks for GOES-R space weather calibration-validation [Shouldis/1QFY13]

★ **Recommend Track for Higher HQ**

Milestones & Performance Measures

FY13 Metrics (2 of 3)

PROPOSED

DSCOVR Program Support	
Request to Archive	Prepare and submit to the NGDC Data Manager the Request To Archive for space environmental data from the NOAA Deep Space Climate Observatory (DSCOVR) mission (TBD/2QFY13)
DSCOVR SA	Develop an draft Submission Agreement (SA) for acquiring processed Deep Space Climate Observatory (DSCOVR) data from the NWS Space Weather Prediction Center (TBD/4QFY13)
SPADES	Incorporate NASA Advanced Composition Explorer(ACE) data into the Satellite Product And Analysis Enerprise System (SPADES) as a pathfinder for operational space weather data (TBD/4QFY13)
Metadata	Create a metadata record for the Deep Space Climate Observatory (DSCOVR) space weather data (TBD/4QFY13)
Earth Observations	
VIIRS Gas Flares	Use Soumi National Polar Partnership (S-NPP) Visible Infrared Imaging Radiometer Suite (VIIRS) data to produce a global map of detected gas flares ranked from largest to smallest (Elvidge/4QFY13)
VIIRS Nighttime Lights	Create a global cloud-free composite map of nightime lights derived from Soumi National Polar Partnership (S-NPP) Visible Infrared Imaging Radiometer Suite (VIIRS)S data (Elvidge/4QFY13)

★ **Recommend Track for Higher HQ**

Milestones & Performance Measures

FY13 Metrics (3 of 3)

PROPOSED

Annual Metrics:	
Space Weather Metric:	Maintain a greater than 97% (2-sigma, cumulative distribution) of available Space Environment Monitor (SEM) data from the Geostationary Operational Environmental Satellites (GOES) are archived on an annual basis (Wilkinson/FY13)
Ionosonde Metric:	Acquire, process and disseminate > 97% (2-sigma, cumulative distribution) of available real-time ionosonde data within 1 hour [TBD] of receipt (Bullett/Annual Metric)
Nighttime Lights Metric:	Acquire, process and disseminate >97% (2-sigma, cumulative distribution) of available real-time nighttime lights imagery within 3 hours of receipt (Elvidge/FY13)
CORS-West Metric:	Provide a >97% (2-sigma, cumulative distribution) availability for Continuously Operating Reference Station (CORS) near-real-time data to the NWS Space Weather Prediction Center (SWPC) as per the '4-way' Memorandum of Agreement and subject to normal business-hour response times. (Coloma/Annual Metric)

★ **Recommend Track for Higher HQ**

OUTLINE
Solar & Terrestrial Physics Division

STP Division Overview

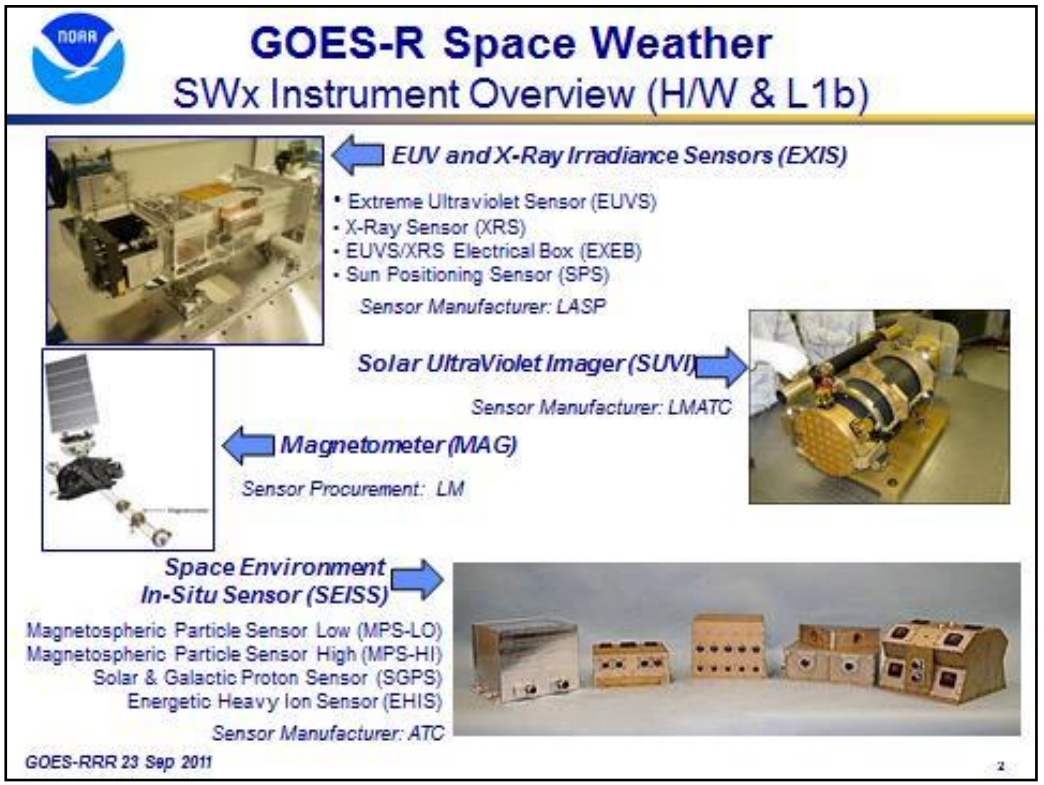
Milestones & Performance Measures

Accomplishments & Updates

Issues & Summary

Accomplishments & Updates
GOES-R SWx Cal-Val

The GOES-R team has now assumed from STAR the full cal-val responsibility for the space weather sensors. The team acts under the auspices of the Calibration Working Group (CWG). The overall program remains fiscally challenged with the efforts needed to address the detailed list of cal-val tasks exceeding the available budget. In FY13 NGDC will receive $300K [*TBD*] total funding for GOES-R cal-val support.

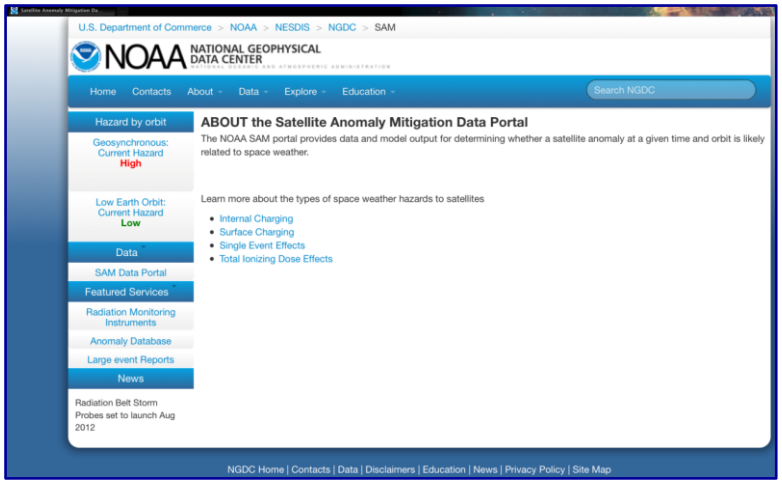


Concern: Cal-Val is considered an element of GOES-R acquisition program. Follow-on support (FY16 and beyond?) for on-orbit sensor maintenance, calibration and post-launch anomaly resolution has not yet been identified. The way forward for processing the L2+ products is still *TBD*.

Accomplishments & Updates
Satellite Anomaly Mitigation (SAM)

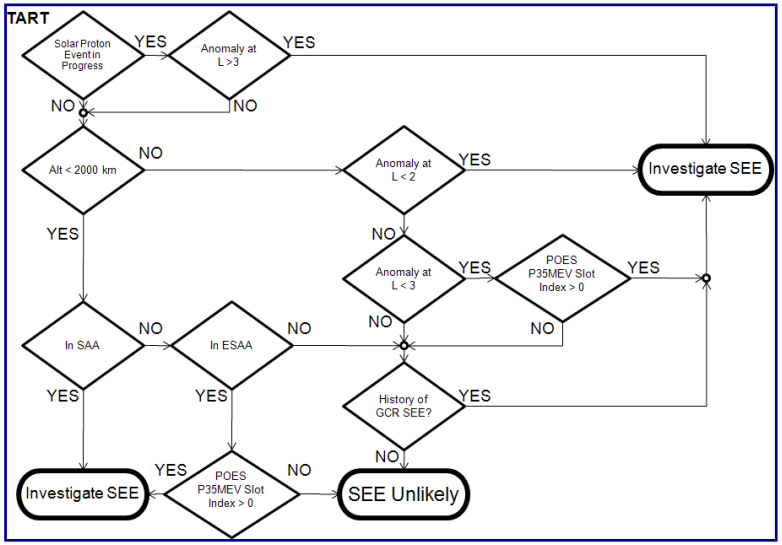
NOAA Satellite Anomaly Information Support Program

1. Satellite Anomaly Mitigation Data portal
2. Anomaly Database
3. Worst case environment description and frequency and impact assessment



Recent Activities

- Recent meetings
  - UNCOPUOS (Oct 2012)
  - Rand (Sep 2012)
  - ISO WG4 on SWx (Oct 2012)
- Upcoming meetings
  - Oslo conference (Oct 22-24, 2012)
  - CGMS (Nov 5-8, 2012)
  - SEASONS (Nov 14-16, 2012)
  - AGU (Dec 3-7, 2012)
  - NRO conference (April, 2013)
- Recent environmental assessments
  - VIIRS anomaly
  - Galaxy 15
  - SkyTerra-1



Accomplishments & Updates
Worst Case Space Environments

NGDC was the recent organizational host of the Space Environment (natural and artificial) Working Group (WG4) of the International Organization for Standardization (ISO). WG4 is formed under the auspices of the ISO Technical Committee (TC20) for Aircraft and Space Vehicles, Sub-Committee (SC14) on Space Systems and Operations. Nearly 40 representations from Russia, Japan, England, Italy, France and the U.S. participated in the ISO meeting on 11-12 Oct and preceding 1-day technical discussions concerning spacecraft charging technologies and radiation belt modeling. Of particular interest to NOAA was development of a **worst-case space environmental standard** to advise the satellite manufacturing community, several representatives of which participated in the meetings.

Janet Brown – Thanks for all your help!

Satellite industry trivia:

- U.S. share of global satellite manufacturing is 52%
- 2/3 of 2011 U.S. satellite manufacturing revenues were derived from government contracts

From the State of the Satellite Industry Report

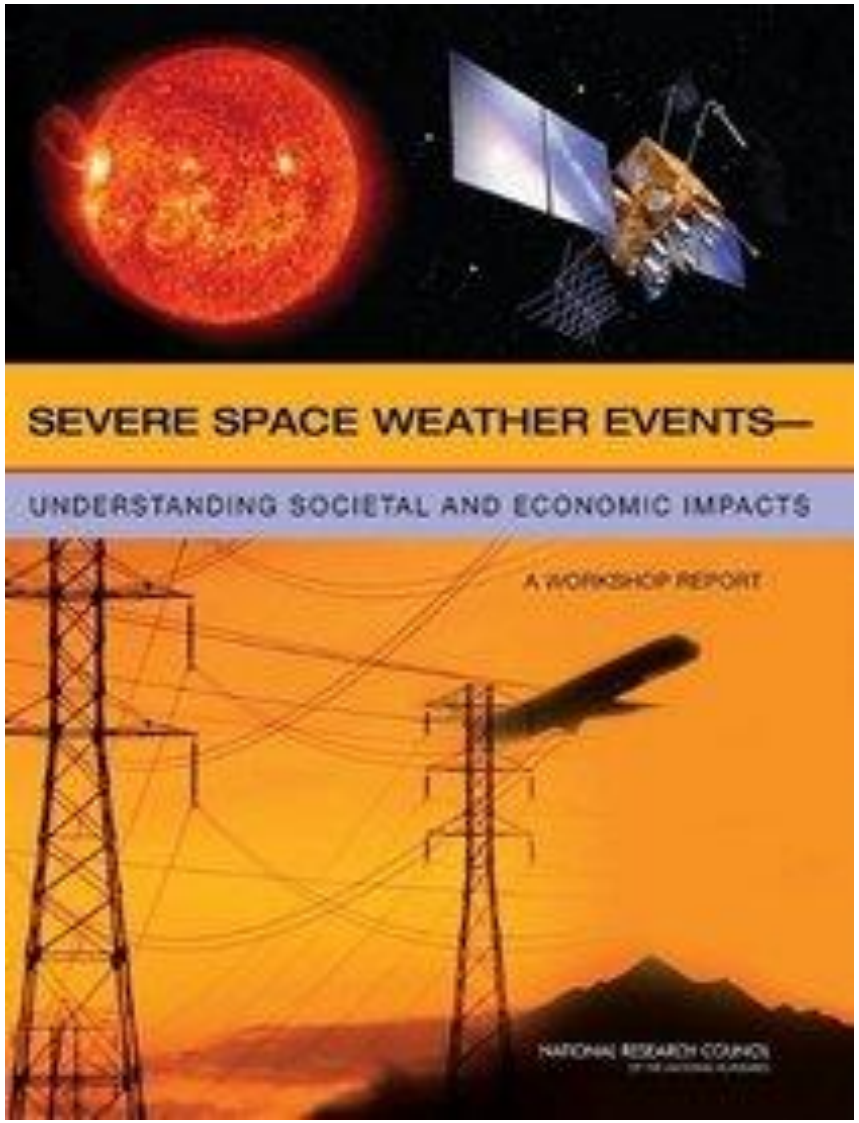
Accomplishments & Updates
Coming to a Theatre Near You!

The Carrington Event

"News of a massive solar flare goes viral. Hours later, the power goes out. Phone is dead. Radio is static. Water taps run dry. Days pass with no news, just people getting more crazy. Weeks pass and the fight for survival has already begun."

The serious socio-economic impacts of a Carrington-like solar/geomagnetic event have been fictionalized in a movie coming soon.

CLICK HERE



Accomplishments & Updates
Space Weather *Sing-a-long*

Space Weather
John Fausett ©2012

Somebody's always observing the sun
With the goal of early detection
Of solar flares and the CME --- Coronal Mass Ejection

Our satellites are impacted by intense radiation
That's how a strong geomagnetic storm
Can stop communications

What happens at the sun doesn't stay at the sun
The Space Weather Prediction Center
Will attempt to alert everyone
When solar weather's on the run (overdone)

Space weather --- most of us don't understand it
Space weather --- and so we take the sun for granted

Accomplishments & Updates

Space Weather *Sing-a-long*

Electric power grids shutting down
From a massive solar eruption
GPS and navigation suffering major disruption

Accomplishments & Updates

Space Weather *Sing-a-long*

Electric power grids shutting down
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GPS and navigation suffering major disruption

It doesn't happen very frequently
But it's something that needs our awareness
We're so dependent on technology
That we need to pay attention --- to solar weather preparedness

Accomplishments & Updates
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Space weather --- you need to be aware in the event of a big solar flare
Or a coronal mass ejection from the sun in our direction
Space weather --- you need to be informed of a strong geomagnetic storm
Be prepared when it comes our way

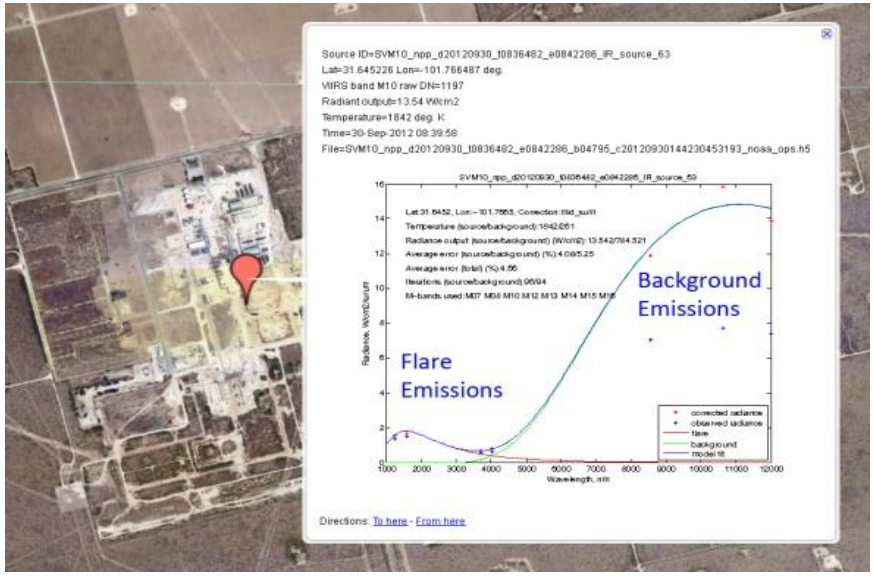
Accomplishments & Updates

USGEO FY12 Task – VIIRS Gas Flares

The Earth Observation Group has completed its FY12 tasks including development of:

- VIIRS cloud detection algorithm tuned for cloud-screen nighttime lights
- Terrain correction for the VIIRS day/night band
- Nighttime combustion source detection system
- Initial global cloud-free composite of VIIRS nighttime lights

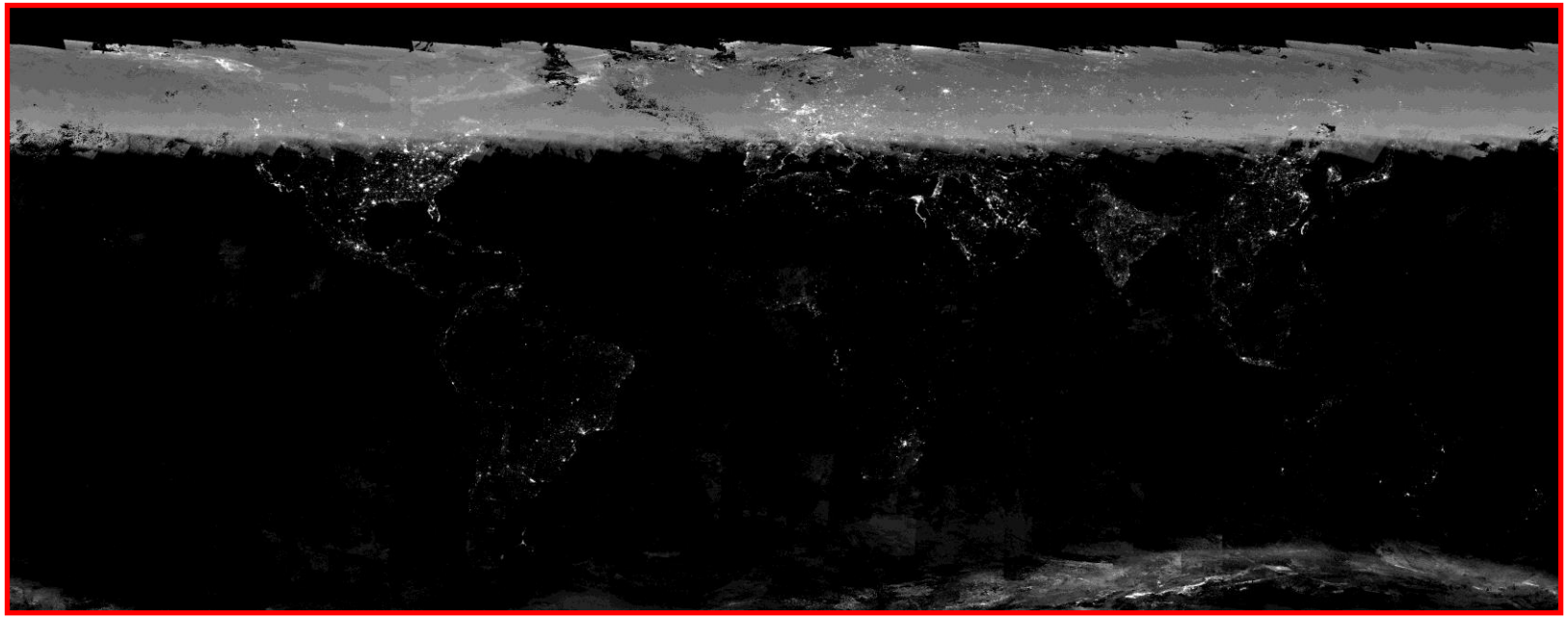
Combustion source detections found with VIIRS data (30Sep-01Oct). Labels indicate areas of wildfires in the Western U.S. and gas flaring in Texas, North Dakota, and Ohio/Pennsylvania



Measurement of gas flaring against normal night-time background emissions. Flare emissions peak near 1.6 nm covered by the VIIRS M10 band. The M10 band only works for detection of combustion sources at night.

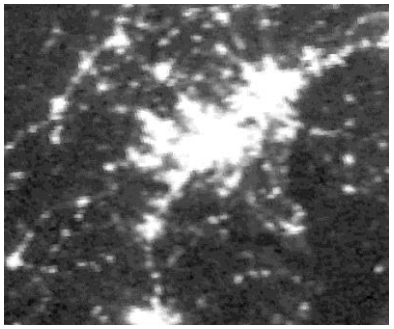
Accomplishments & Updates

1st VIIRS Global Cloud-Free Composite



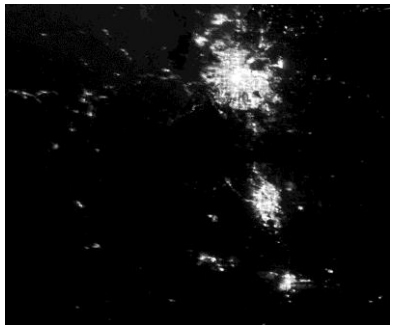
Stray Light

VIIRS

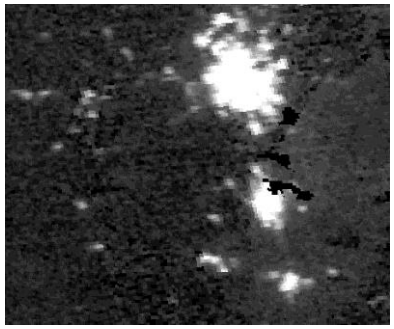


OLS

Washington D.C.



VIIRS



OLS

Denver, Colorado

VIIRS vs OLS Comparisons

Data from 18-26 April 2012

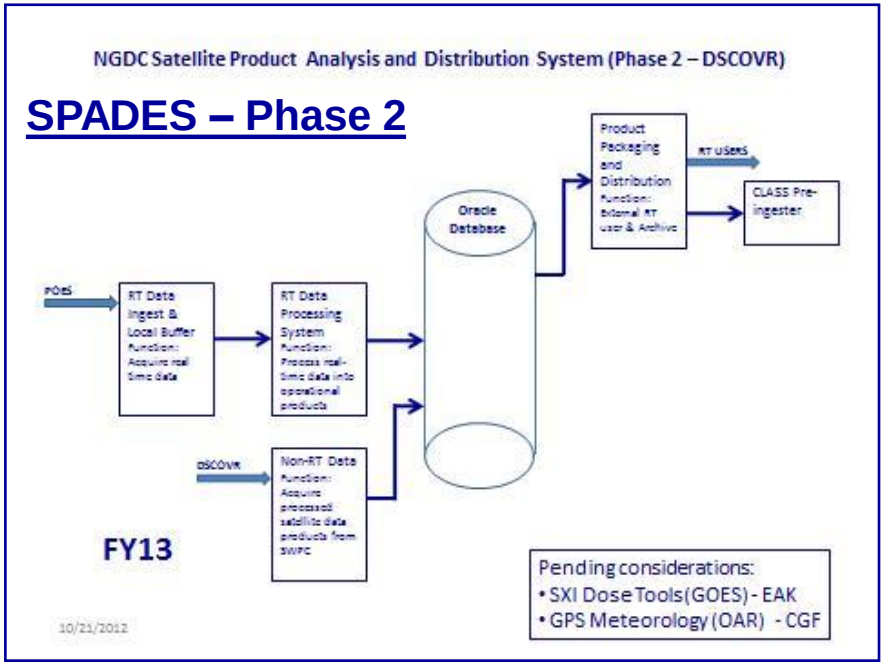
Accomplishments & Updates
Combustion Source Data Service

Nightly global VIIRS combustion source detections are now available through the NGDC web pages. The primary objective of the service is to provide global satellite data for estimation of CO_2 emissions from gas flares. Project is sponsored by the JPSS proving grounds program.

http://www.ngdc.noaa.gov/dmsp/data/viirs_fire/viirs_html/download_viirs_fire.html

Accomplishments & Updates
DSCOVR Status

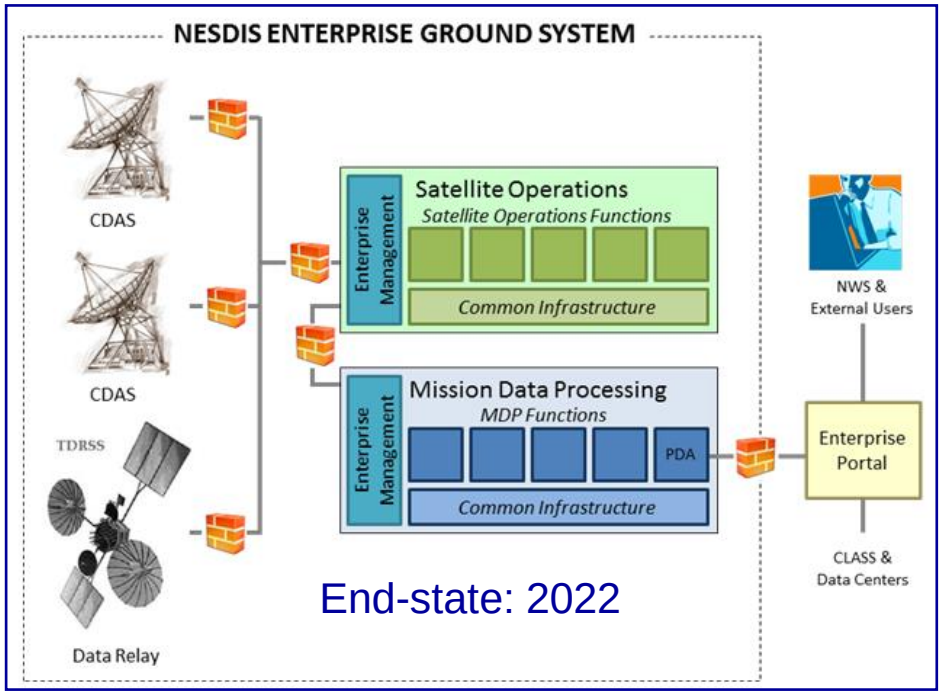
The DSCOVR spacecraft is still on track for a mid CY2014 launch. In FY13 NGDC is funded to start preparing for the receipt and stewardship of DSCOVR solar wind data. The *Request To Archive* paperwork has been drafted in anticipation of an official request. SPADES phase 2 is planned for a 3QFY12 Agile-team development using prototype data from the NASA Advanced Composition Explorer (ACE) spacecraft.



Accomplishments & Updates

NESDIS Enterprise Ground Study

- NOAA Science Advisory Board Satellite Task Force highlighted value of NESDIS pursuing an "Enterprise Ground System (EGS)"
- 30-day EGS study on opportunities, feasibility, and costs (savings) – done 15 Jun 2012
- 5 areas for continued action
  - IT Security Controls
  - Technical Reference Model
  - *Common Algorithms*
  - Data Distribution
  - Organizing to Implement
- Common Algorithms – examine feasibility of optimizing & efficiently implementing existing and new algorithms/products.
- *Example:* Exploit commonalities between magnetometer algorithms for GOES-R and DSCOVR
- Considerations: Use EGS for reprocessing? CDR?



Develop a Vision and Concept of Operations for a single, integrated EGS architecture that promotes development, sustainment, and operations cost efficiencies (near & long term) and cost avoidances while minimizing risk – completion by 23 Nov 2012

Accomplishments & Updates
CORS Operational Status

FY12 COOP Actions

10/12/11 Planned Event – CORS-W Maintenance
All collections switched to CORS-East

10/21/11 Unplanned Event – CORS-E Server Failure
All collections switched to CORS-West

12/06/11 Planned Event – CORS-W Firewall Install
All collections switched to CORS-East

12/12/11 Planned Event – CORS-W Patching
All collections switched to CORS-East

02/29/12 Planned Event – CORS-W Re-configure
All collections switched to CORS-East

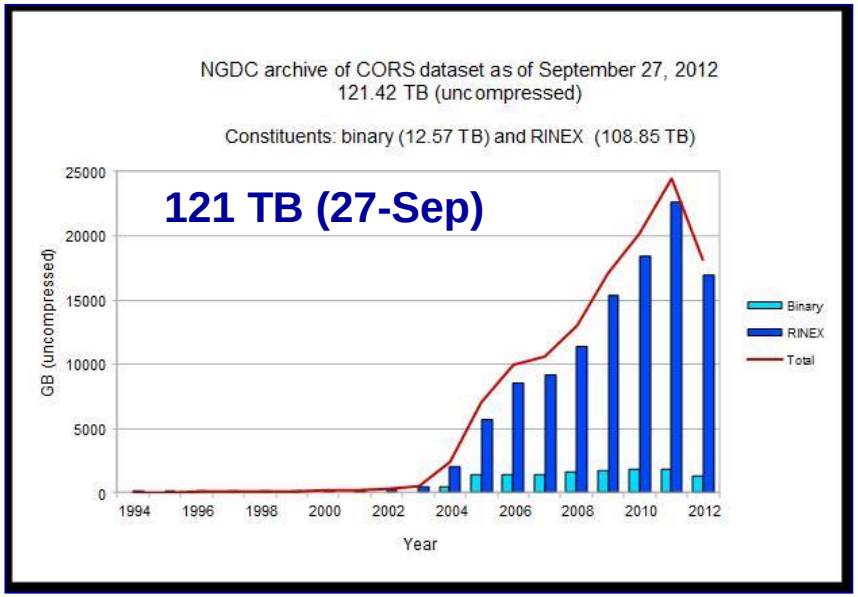
03/22/12 Unplanned Event – SSMC3 Fire
All collections switched to CORS-West

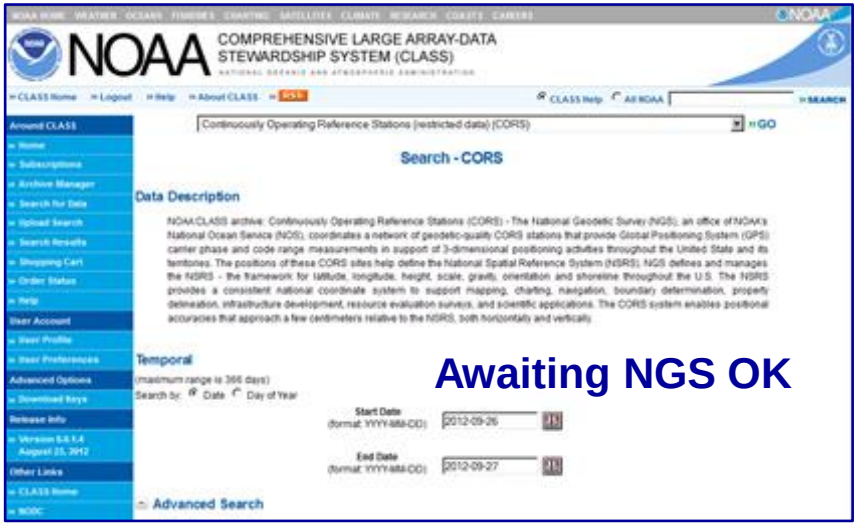
06/27/12 Unplanned Event – Boulder Wildfire
All collections switched to CORS-East

07/20/12 Planned Event – SSMC3 repairs
All collections switched to CORS-West

08/01/12 Unplanned Event – CORS-E COMM failure
WAAS collection switched to CORS-West

08/13/12 Planned Event - CORS-W Maintenance
All collections switched to CORS-East

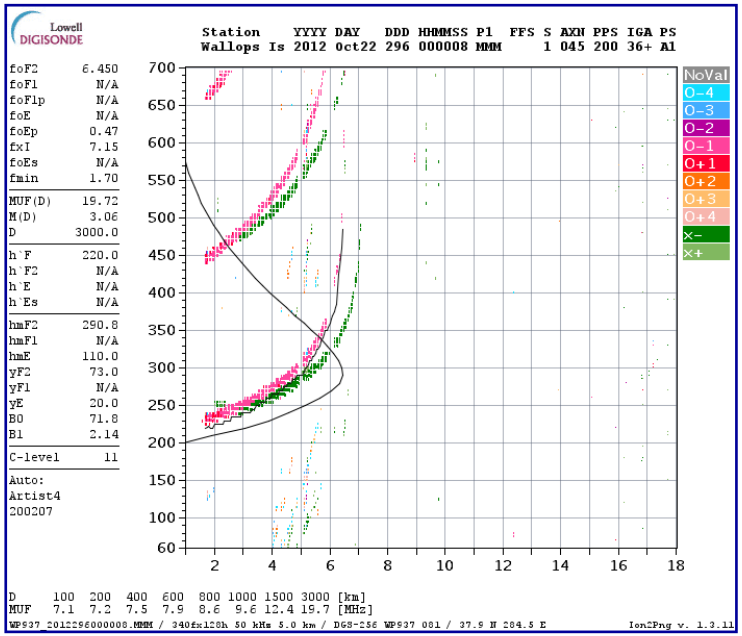




Accomplishments & Updates

Ionosonde Upgrade – Wallops Island

During the week of 24 Sep, Terry Bullett and Justin Mabie upgraded the Wallops Island Ionosonde with a new transmitter. This upgrade is associated with the transfer of the instrument from the U.S. Air Force Weather Agency to the NASA Wallops Island Flight Facility. The Wallops Island ionosonde is a key ionospheric sensor for supporting go/no-go decisions for NASA's sounding rocket launches and for providing space weather information to real-time users. Continued ionsonde measurements from Wallops Island also **extend the longest ionospheric climate data record in the U.S. originally begun in 1938**. Access to the real-time data is available through Mirrion.



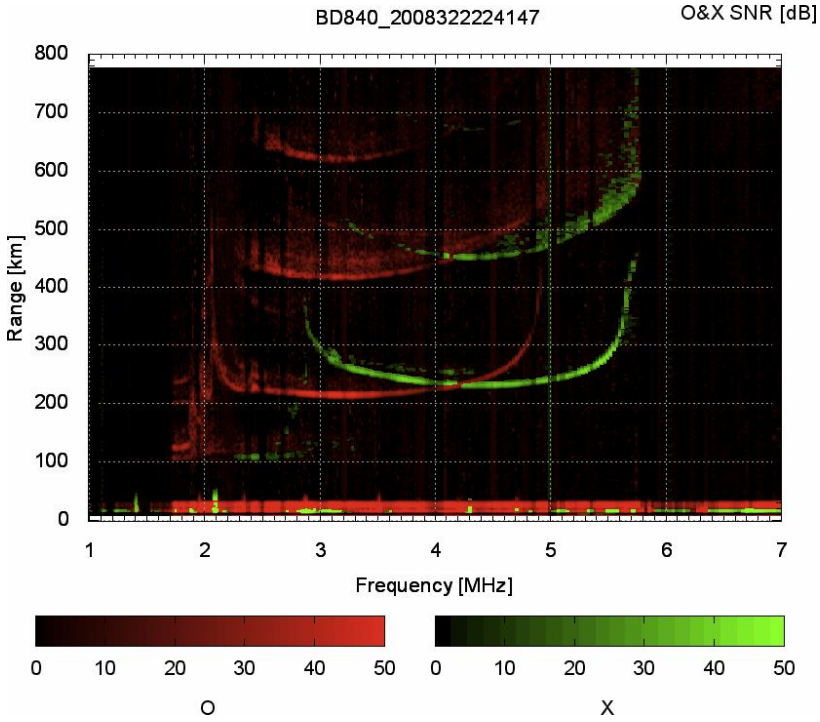
W.I. Ionogram (via Mirrion)

NASA Wallops Flight Facility

Accomplishments & Updates

NICT Visit

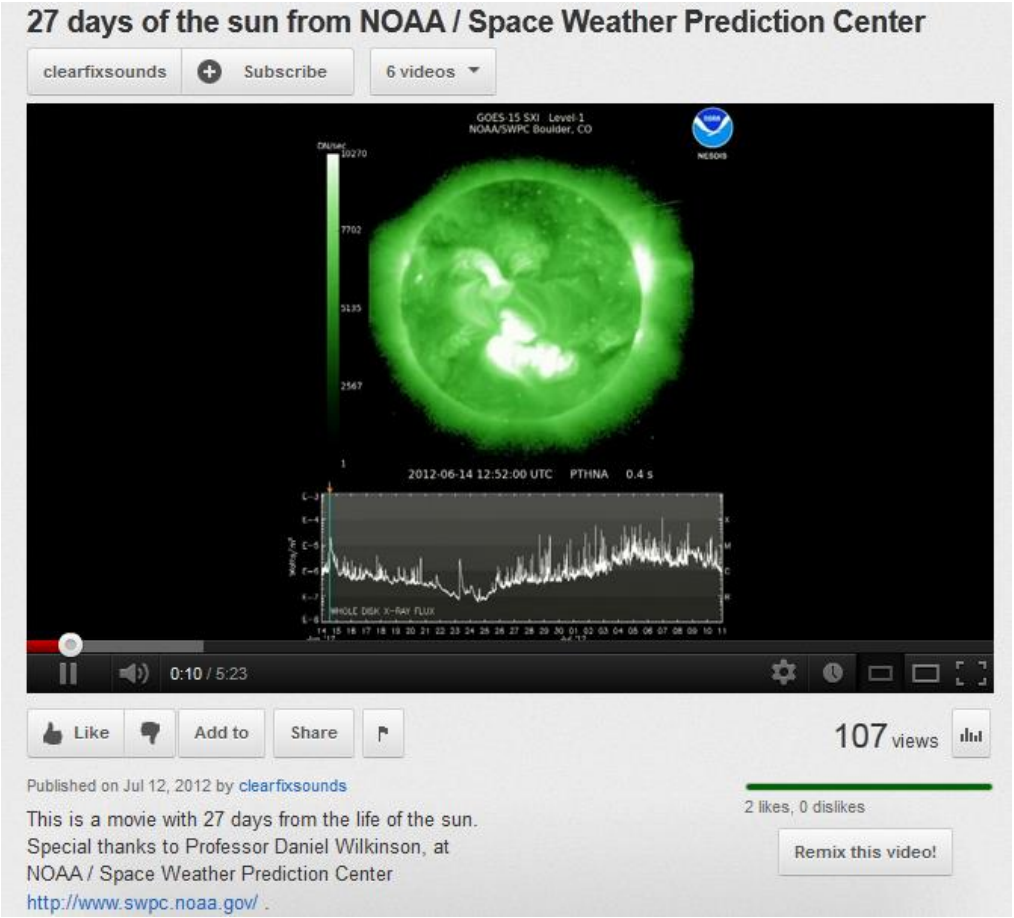
Scientists from the Japanese National Institute of Information and Communications Technology (NICT) visited NGDC during the week of 30 Jul 2012 to assess the performance of a heritage ionospheric sounder compared to the new generation Vertical Incidence Pulsed Ionospheric Radar (VIPIR). The difference between the approaches is akin to a space domain (heritage) versus time domain (VIPIR) analysis. Boulder station (BC840) has both the heritage and VIPIR instruments running side-by-side for comparison. Drs Takashi Murayama, Takuya Tsugawa and Tsutomu Nagatsuma from NICT will use the information learned during this visit to decide which approach NICT will adopt.



Accomplishments & Updates

One Last Musical Interlude

Special thanks to Professor Daniel Wilkinson at
NOAA / Space Weather Prediction Center – *What ?????*



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OUTLINE
Solar & Terrestrial Physics Division

STP Division Overview

Milestones & Performance Measures

Accomplishments & Updates

Issues & Summary

Issues & Summary
STP FY12 Publications – 16 (1 of 2)

Publications (FY12):

Allen, J. H., **C. A. Clark**, **W. F. Denig** and **D. C. Wilkinson** (2012), Historical Upper Atmosphere Geophysics Reports Now Available Online, Space Weather, 10, S05007, doi:10.1029/2012SW000802.

Alvarez, R., II, C. Senff, A. Langford, A. Weickmann, D. Law, **J. Machol**, D. Merritt, R. Marchbanks, S. Sandberg, W. Brewer, R. Hardesty, and R. Banta (2011), "Development and application of a compact, tunable, solid-state airborne ozone lidar system for boundary layer profiling", J. Oceanic Atmos. Tech., 28, 1258-1272, doi: 10.1175/JTECH-D-10-05044.1.

Araujo-Pradere, E.A., D. Buresova, **D.J. Fuller-Rowell**, and T.J. Fuller-Rowell (2012), Initial results of the evaluation of IRI hmF2 performance for minima 22-23 and 23-24, *Adv. Space Res., in press.*

Chaturvedi M., **T. Ghosh**, and L. Bhandari. (2011). Assessing income distribution at the district level for India using nighttime satellite imagery. *Proceedings of the 32nd Asia-Pacific Advanced Network Meeting*. New Delhi, India.

Elvidge, C.D., P.C. Sutton, **K.E. Baugh**, **S. Anderson**, **T. Ghosh** and **D. Ziskin** (2011) Satellite observation of urban metabolism in China, Proceedings of the Asian Conference on Remote Sensing, Taipei, Taiwan, October 3, 2011.

Elvidge, C.D., **K.E. Baugh**, **P.C. Sutton**, B. Bhaduri, B.T. Tuttle, **T. Ghosh**, **D. Ziskin** and **E.H. Erwin** (2011), "Who's In The Dark: Satellite Based Estimates Of Electrification Rates", *Urban Remote Sensing: Monitoring, Synthesis and Modeling in the Urban Environment*, Ed. X. Yang, Wiley-Blackwell, Chichester, UK, p. 211-224.

Elvidge, C. D., **K.E. Baugh, S.J. Anderson**, **P.C. Sutton**, **and T. Ghosh** (2012), The Night Light Development Index (NLDI): a spatially explicit measure of human development from satellite data, Soc. Geogr., 7, 23-35, doi:10.5194/sg-7-23-2012.

Kristina H.Y., **S.J. Anderson**, R.L. Powell, D.G. Sullivan and P.C. Sutton (2011), Identifying Similar Biophysical Characteristics among Nesting Beaches of Green Turtles of Turkey Using Remote Sensing Techniques, International Journal of Remote Sensing Applications (IJRSA), pp. 22-29, 31-Dec-2011.

Machol, J.L., **J.C. Green**, **R.J. Redmon**, R.A. Viereck and P.T. Newell (2012), Evaluation of OVATION Prime as a Forecast Model for Visible Aurorae, *Space Weather, 10*, S03005, doi:10.1029/2011SW000746.

Redmon, R.J. (2012), Upwelling to Outflowing Oxygen Ions at Auroral Latitudes during Quiet Times: Exploiting a New Satellite Database, PhD Thesis, University of Colorado, Boulder, CO.

Redmon, R.J., W.K. Peterson, L. Andersson and **W.F. Denig** (2012)**,** A global comparison of O^+ upward flows at 850 km and outflow rates at 6000 km during nonstorm times, *J. Geophys. Res.*, 117, A04213, doi:10.1029/2011JA017390.

Rodriguez, J.V. (2012), Undulations in MeV solar energetic particle fluxes in Earth's magnetosphere associated with substorm magnetic field reconfigurations, *J. Geophys. Res.*, 117, A06229, doi:10.1029/2012JA017618.

Issues & Summary
STP FY12 Publications – 16 (2 of 2)

Publications (continued):

Rodriguez, J.V., H.C. Carlson Jr., and R.A. Heelis (2012), Auroral forms that extend equatorward from the persistent midday aurora during geomagnetically quiet periods, *Journal of Atmospheric and Solar-Terrestrial Physics, 86*, 6–24.

Rowland, W., and R. S. Weigel (2012), Intra-calibration of Particle Detectors on a Three-Axis Stabilized Geostationary Platform, Space Weather, doi:10.1029/2012SW000816, in press.

Small, C., **C.D. Elvidge**, D. Balk and M. Montgomery (2011), "Spatial scaling of stable night lights", *Remote Sensing of Environment*, Elsevier, 115 (2011), 269-280.

Zhao, N., **T. Ghosh**, N. A. Currit and **C.D. Elvidge** (2011). Relationships between satellite observed lit area and water footprints, *Water Resource Management*, *25*, 2241-2250.

ftp://ftp.ngdc.noaa.gov/STP/publications/stp_publications/stp_publications.pdf

Issues & Summary
STP FY12 Presentations – 51 (1 of 4)

Presentations (YTD):

32nd Asian Conference on Remote Sensing (ACRS), 03-07 Oct 2011, Taipei, Taiwan

– Satellite observation of urban metabolism in China (Oral), **C.D. Elvidge**, P.C. Sutton, **K.E. Baugh**, **S. Anderson**, **T. Ghosh**, and **D. Ziskin**

US-UK Space Weather Workshop, 11-13 October 2011, Boulder, CO

– What are the requirements from satellite customers (Oral), **J.C. Green**

7th GOES Users' Conference, 15-21 October 2011, Birmingham, AL

– GOES Data and Products in the Space Weather Forecast Office (Oral), **M. Shouldis**, R. Viereck, S. Hill, J. Rigler, **J.V. Rodriguez**, and P. Lotoaniu

5th International Association for the Advancement of Space Safety, 17-19 October 2011, Paris, France

– Space Environmental Conditions at the Time of the Galaxy 15 Anomaly (Oral), J.M. Kunches, **W. Denig**, **J. Green**, **D. Wilkinson**, **J. Rodriguez**, H. Singer, P. Loto'aniu, W. Murtagh and D. Biesecker

Low-Latititde Ionospheric Sensor Network, 06 November 2011, Sao Jose Dos Campos, Brazil

– Advanced Ionospheric Sounding with Vertical Incidence Pulsed Ionospheric Radar (Invited Oral) - **T.W. Bullett**.

Hokkaido University, 08 November 2011, Hakodate, Japan

– Long term trends in satellite observed lit fishing boat activity, **C.D. Elvidge**

Ministry of Agriculture, Forestry and Fisheries (MAFF), 10 November 2011, Tsukuba, Japan

– Trends in fishing boat activity observed from space, **C.D. Elvidge**

National Institute for Advanced Industrial Science and Technology (AIST), 10 November 2011, Tsukuba, Japan

– Prospects for monitoring gas flares with ASTER data, **C.D. Elvidge**

Institute of Arctic and Alpine Research (INSTAAR) Noontime Seminar, 14 November 2011, Boulder, CO

– Aurora, Space Physics and Nighttime Lights of the World (Oral), **W.F. Denig**

2nd Low Latitude Ionospheric Sensor Network Workshop, 07-10 November 2011, São José dos Campos, Brazil

– Advanced Ionospheric Sounding with Vertical Incidence Pulsed Ionospheric Radar, **T. Bullett**

– Detection of Spread-F and foF2 values using Digisonde and VIPIR instruments, **P. Bhaneja** and **T. Bullett**

International School for Atmospheric Radars, 11-23 November 2011, Chung-Li, Taiwan

– High Frequency Radars and Ionospheric Sounding (Invited Lecture), T.W. Bullett

European Space Weather Week-8 (ESWW8), November 28 - December 02, 2011, Namur, Belgium

– Space Environmental Data and Information Available from U.S. Civilian Operational Space Weather Systems (Poster), **W.F. Denig** and **J.V. Rodriguez**

Issues & Summary
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Presentations (continued)

– New Measurements of Magnetospheric Particle Fluxes, Densities and Temperatures on GOES 13-15 (Poster), **J.V. Rodriguez**, **J.C. Green**, T. Onsager and H. Singer

American Geophysical Union (AGU) Fall Meeting, 05-09 December 2011, San Francisco, CA

– Equatorial electron flux pulsations correlated with ground-based pulsating aurora observations (Poster), SM13B-2038, Allison N. Jaynes, M. Lessard**, J.V. Rodriguez** and K.M. Rychert

– New Directions for the NOAA Solar and Terrestrial Physics Division (Poster), SM21A-1997, **W.F. Denig**

– Extreme Events in GOES Space Environment Monitor Data 1974 – 2011 (Poster), NG23A-1484, **D.C. Wilkinson** and **A.S. Sundaravel**

– Measured and Modeled O+ Upwelling at 800 km: Understanding the Dayside Asymmetry (Poster), SM31A-2093, **R.J. Red**mon, W.K. Peterson, L. Andersson and P.G. Richards

– Evaluation of Ovation Prime as a Forecast Model of Visible Aurora (Poster), SM31B-2101, **J.L. Machol**, **J.C. Green**, **R.J. Redmon**, R.A. Viereck and P.T. Newell

– Detailed Characterization of Substorm Dipolarization and Particle Injection from an Unprecedented Constellation of Geosynchronous Satellites (Poster), SM31B-2114, **J.C. Green**, H.J. Singer, T.G. Onsager**, J.V. Rodriguez**, **W.F. Denig**, **D.C. Wilkinson** and **J.L. Machol**

– National Trends in Satellite Observed Lighting: 1992–2009 (Oral, Invited), GC32C-03, **C.D. Elvidge**, P.C. Sutton, **K. Baugh**, **D.C. Ziskin**, **T. Ghosh** and **S. Anderson**

– The Unusual Response of the Magnetosphere to Solar Wind Conditions during the Galaxy 15 Substorm (Oral), SM32A-05, H.J. Singer, R.L. McPherron, **J.C. Green**, **J.V. Rodriguez** and **R.J. Redmon**

– Spatial Resolution and Detection Limit Considerations for Low Light Imaging of Urban Land Use Patterns (Poster), GC33B-1081, S. Anderson, **C. Elvidge** and P.C. Sutton

– Anatomy of a Radiation Belt Flux Dropout (Poster), SM41B-2026, J.F. Fennell, R.H. Friedel, **J.C. Green**, T.B. Guild and J.E. Mazur

– Modeling and Observations of the East-West Effect in Solar Energetic Particle Flux at Geosynchronous (Poster), SM31B-2103, Brian T. Kress and **J.V. Rodriguez**

– On the Relativistic Electron Injection Event in Early April 2010 (Poster), SM51B-2079, J.B. Blake, P. Obrien, **J.V. Rodriguez and J.C. Green**

– Comparison of Simulated and Observed Ring Current Magnetic Field and Ion Fluxes and ENA Intensity during the 5 April 2010 Storm (Oral), SM54A-08, M.W. Chen, C. Lemon, T.B. Guild, M. Schulz, A. Lui, A.M. Keesee, J. Goldstein and **J.V. Rodriguez**

American Meteorological Society, 22-26 January 2012, New Orleans, LA

– New Operational Algorithms for Charged Particle Data from Low-Altitude Polar-Orbiting Satellites (Poster), **J.L. Machol, J.C. Green**, **J.V. Rodriguez**, T.G. Onsager, **W.F. Denig** and **P.N. Purcell**

Issues & Summary
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Presentations (continued)

Geospatial Forum, Gurgaon, Haryana, India, 07-09 February 2012, Haryana, India

– Evaluating district-level income distribution for India using nighttime satellite imagery and other datasets (Oral), **T. Ghosh**, M. Chaturvedi, L. Bhandari, **C. D. Elvidge** and **K. E. Baugh**

LASP Friends of the Magnetosphere, 20 March 2012, Boulder, CO

– Upwelling to Outflowing Oxygen Ions at Auroral Latitudes during Quiet Times:Exploiting a New Satellite Database (Oral), **R.J. Redmon** and L.A. Peterson

Inner Magnetosphere Coupling II, 19-22 March 2012, Los Angeles, CA

- New data, research, and products from the NOAA satellite fleet (Poster), **J.C. Green**, **W. Denig**, **J. Rodriguez**, **J. Machol**, T. Onsager, **R. Redmon**, H. Singer and **D. Wilkinson**

Space Weather Workshop, 24-27 April 2012, Boulder, CO

- Satellite Meeting Overview (Oral**), J.C. Green**
- New Space Weather Particle and Magnetic Field Products at NGDC (Poster**), R.J. Redmon**, **J. Green**, **W. Denig**, **J. Darnel**, **J. Machol**, **J. Rodriguez**, **W. Rowland**, **M. Shouldis** and **D. Wilkinson**
- Implementation of Space Environmental Anomalies Expert System Real Time (Poster), **J. Darnel**, **J. Green** and **W. Denig**
- Identifying Space Weather Events Using a Multichannel Statistical Classifier (Poster), E.J. Rigler, S.M. Hill, J.L. Gannon, A.A. Reinard, R.A. Steenburgh, **J.M. Darnel** and J. Vickroy
- Electron Observations at GEO During the High Speed Stream (HSS) Commencing on January 6th 2011 (Poster), D. P. Hartley, M. H. Denton, **J. C. Green**, T. Onsager, **J. V. Rodriguez** and H. J. Singer
- Geomagnetic Cutoffs at Synchronous Altitude Revisited (poster), B. T. Kress and **J. V. Rodriguez**

CIRES Science Rendezvous, Boulder, CO, 24 April 2012

- Evaluation of Ovation Prime as a Forecast Model for Visible Aurorae (Poster), **J. Machol**, **J. Green**, **R. Redmon**, Rodney Viereck and Patrick Newell
- Auroral forms that extend equatorward from the persistent midday aurora during geomagnetically quiet periods (Poster), **J.V. Rodriguez**, H. C. Carlson, Jr., and R. A. Heelis
- NGDC's first foray into CLASS: the transition of data archive and stewardship into an external archival facility (Poster), **F. Coloma**, **R. Prentice** and **P. Elespuru**

Issues & Summary
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Presentations (continued)

GOES Science Week, 30 April – 04 May 2012, Kansas City, MO

- GOES-R Space Weather L2+ Algorithm Development (Oral & Poster), **W.F. Denig**

Second International Workshop on Earth Observation and Remote Sensing Applications (EORSA 2012) , 11 June 2012, Tongji University, Shanghai, China

- VIIRS nighttime lights (Oral), **C.D. Elvidge**

East China Sea Fisheries Research Institute (ECSFRI), 12 June 2012, Shanghai China

- Satellite observation of lit fishing boats (Oral), **C.D. Elvidge**.

Geospace Environment Modeling (GEM), 17-22 June 2012, Snowmass, CO

- Dynamic Auroral Boundaries using DMSP (Oral), **R.J. Redmon**, W.K. Peterson and L.A. Andersson
- Auroral forms that extend equatorward from the persistent midday aurora (oral**), J. Rodriguez** and C. Valladares
- Upwelling to Outflowing O+ (poster), R.J. Redmon, W.K. Peterson, L.A. Andersson and P.G. Richards
- Undulations in MeV Solar Energetic Particle Fluxes in Earth's Magnetosphere Associated with Substorm Magnetic Field Reconfigurations (poster), **J. Rodriguez**
- New Space Weather Auroral, Particle and Magnetic Field Products at NGDC (poster), **R.J. Redmon**, **J. Green**, **W.F. Denig**, **J. Darnel**., **J. Machol**, **J. Rodriguez**., **W. Rowland**, **M. Shouldis**, and **D. Wilkinson**

NASA's Applied Science Applications for Suomi NPP Data Workshop, 22 June 2012, Washington, DC

- VIIRS observations of nighttime lights and gas flares (Oral), **C.D. Elvidge**

California Air Resources Board Low Carbon Fuel Standard Workshop, 13 July 2012, Sacramento, California

- Satellite estimation of gas flaring CO2 emissions (Oral), **C.D. Elvidge**

High Energy Particle Precipitation into the Atmosphere (HEPPA) – 09-11 October 2012, Boulder, CO

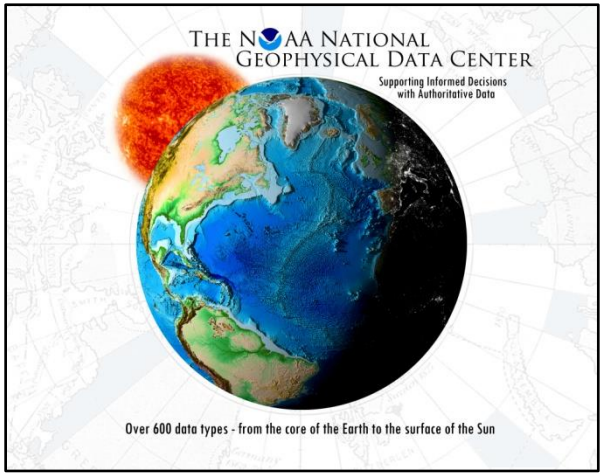
- High Energy Particle Precipitation in the Atmosphere, Boulder, CO, 9-12 October 2012 Update on the NOAA Polar Satellite Program, Data, and Products (Poster), **J. Machol**, **J. Green**, **W. Denig**, T. Sotirelis, **D. Wilkinson**, **J. Rodriguez** and **R. Redmon**

ftp://ftp.ngdc.noaa.gov/STP/publications/stp_presentations/stp_presentations.pdf

Issues & Summary
Solar & Terrestrial Physics Division

- ✓ **Federal travel restrictions limit program growth (4QFY12) – active**
- ✓ **Fed hiring restrictions having mission impact (3QFY12) – *active***
- ✓ **GOES-R L2+ SWx algorithms (3QFY11) – *stalled (no action)***
- Loss of key personnel has a severe mission impact (3QFY10) - *NLAI*
- Satellite processing transition from SWPC (4QFY09) – *DOA/NLAI*
- Continuity of solar data services (1QFY09) – *NLAI*
- *Refocus of NWS/SWPC Objectives (2QFY08) – NLAI*

Metrics (FY12 - Done)
Papers Published: 16
Presentations: 51
Indices Bulletins: 23



NLAI – No Longer An Issue

QUESTIONS?